

MagiQ Technologies

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MagiQ is an R&D company with a proven track record of delivering innovative solutions. Our key strengths include:

- Fiber and free-space optics
- Non-linear optics
- Single-photon detection
- High-speed digital and analog design
- FPGA and software design
- Low jitter clock synchronization
- Fiber interferometry
- Fiber stabilization

Our skills have been applied to the development of:

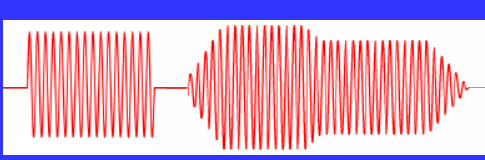
- QKD systems
- RF AWG and Pulse Generators *(for multi-qubit operation)*
- Heralded photon sources
- Entangled photon sources *(time-bin and polarization)*
- Narrowband light sources for precise qubit control

We offer solutions for all types of qubits:

- Quantum Dots
- Neutral Atoms
- Trapped Ions
- Photons

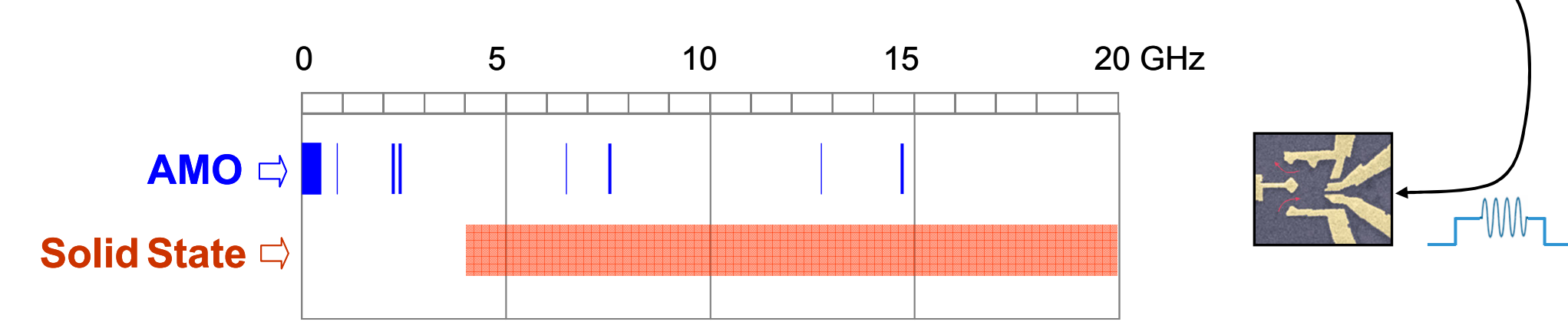
We are open to collaborations.

RF Pulse Programmer



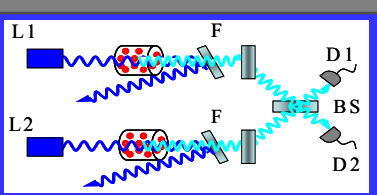
Need: Precise multi-qubit control
Solution: Scalable multi-channel RF pulse programmer:

- Multi-qubit manipulation and readout
- Expandable to over 100 channels Sub-picosecond clock jitter
- High fidelity RF synthesizers and I/Q mixers



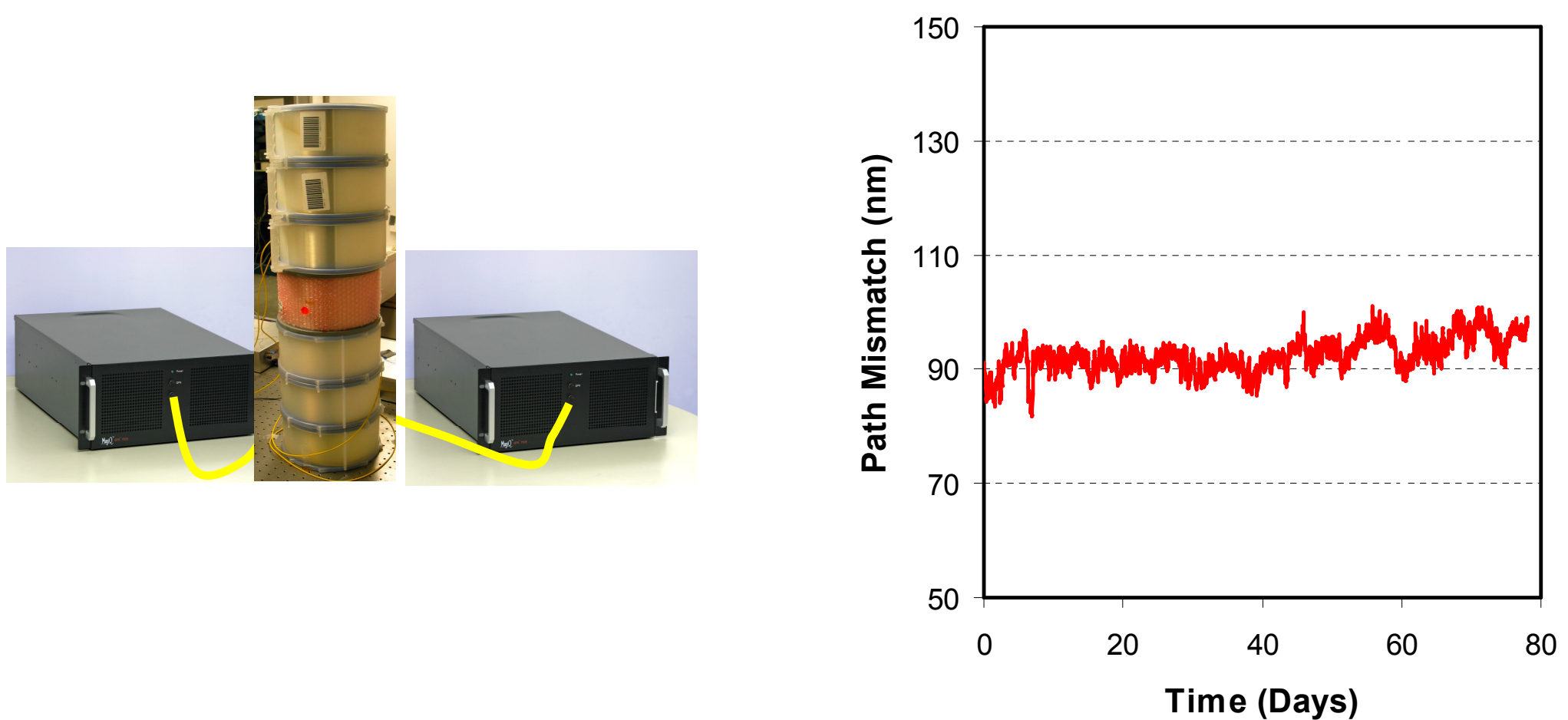
- Additional funding is needed to:
- Accelerate the development of the SHF (4 – 20 GHz) module
 - Deliver cost effective scalable solution for SHF range
 - Develop a photonics-based ultra-high bandwidth and high extinction ratio module

Remote Qubit Synchronization



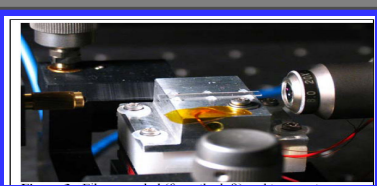
Need: Preserve qubit coherence over distance
Solution: Fiber length stabilization

- Exact path matching eliminates phase error
- Balanced differential detection eliminates RIN
- Actively tracked quadrature bias guarantees linear operation for high dynamic range



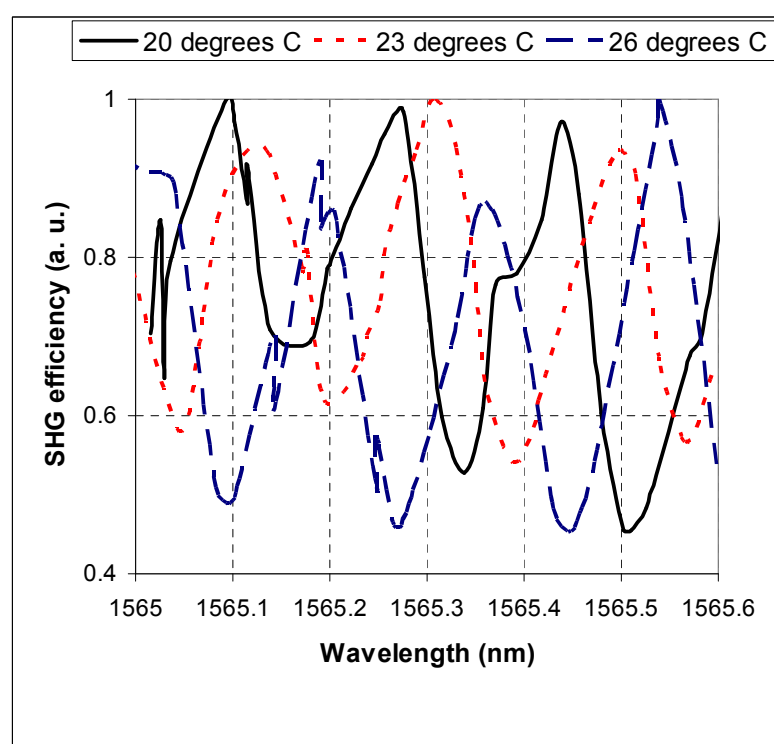
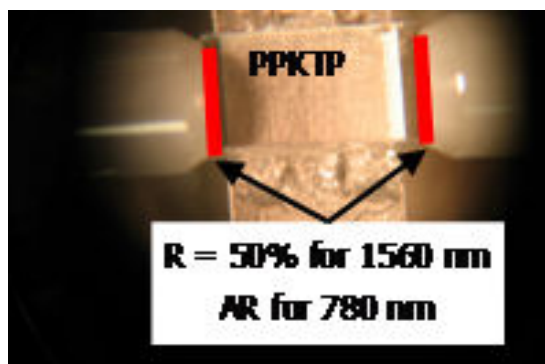
- Additional funding is needed to:
- Extend stabilization technique to greater fiber lengths (up to 10 km) making it practical for remote qubit operation

Narrow-Band Photon Sources



Need: Practical qubit-specific photon sources
Solution: Intracavity parametric down conversion in periodically poled waveguides

- Compact & efficient
- Tunable output
- Adjustable bandwidth



Parameter	PPKTP Waveguide	NCPM MgO:LiNbO3 Bulk
Pump power (532-nm)	0.4 mW	100 mW
Photon rate (1550-nm)	50,000/second	44,000/second
Heralding efficiency	70%	40%
Uncorrelated photons	1.6%	~1%

- Additional funding is needed for:
- Further development of practical waveguide-based sources for multi-qubit applications



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